

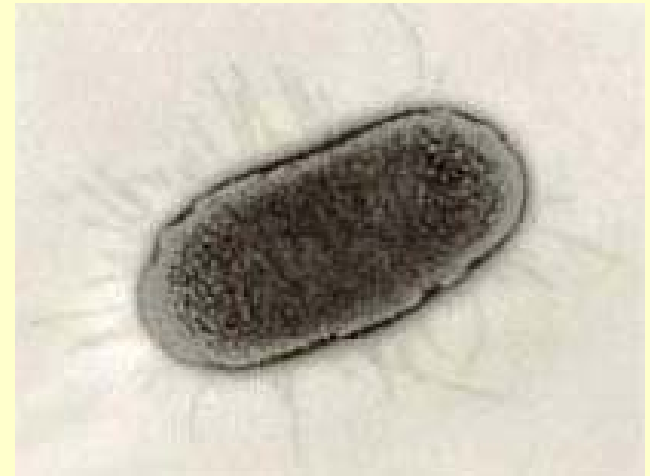
# Who's Pooping in the Portneuf?

## Spatial and Temporal Distribution of *Escherichia Coli*.

**Patterns in space – where are they?**

**Patterns in time – when are they?**

**Sources?**



Richard Inouye, Chris Wilhelm, Andy Ray, Jim Brock, Skylar Stone, Murphy Woodhouse, John Hughes, Martha Inouye, Jason Pappani, Lynn Van Every, Mike Rowe, City of Pocatello, Three Rivers, ID DEQ, Rapid Creek Research, NSF, BIOS 209 students, Nate & Kate



Center for  
Ecological  
Research and  
Education



Portneuf River  
Ecosystem Project

# What is *E. coli*?

***Escherichia coli*** – bacteria that lives in the gut of warm blooded animals; comprises about 0.1% of the bacteria in the gut of adult humans on a typical western diet.



**Provide much of the K and B-complex vitamins we require.**

**The presence of *E. coli* in water indicates recent contamination with sewage or animal waste.**

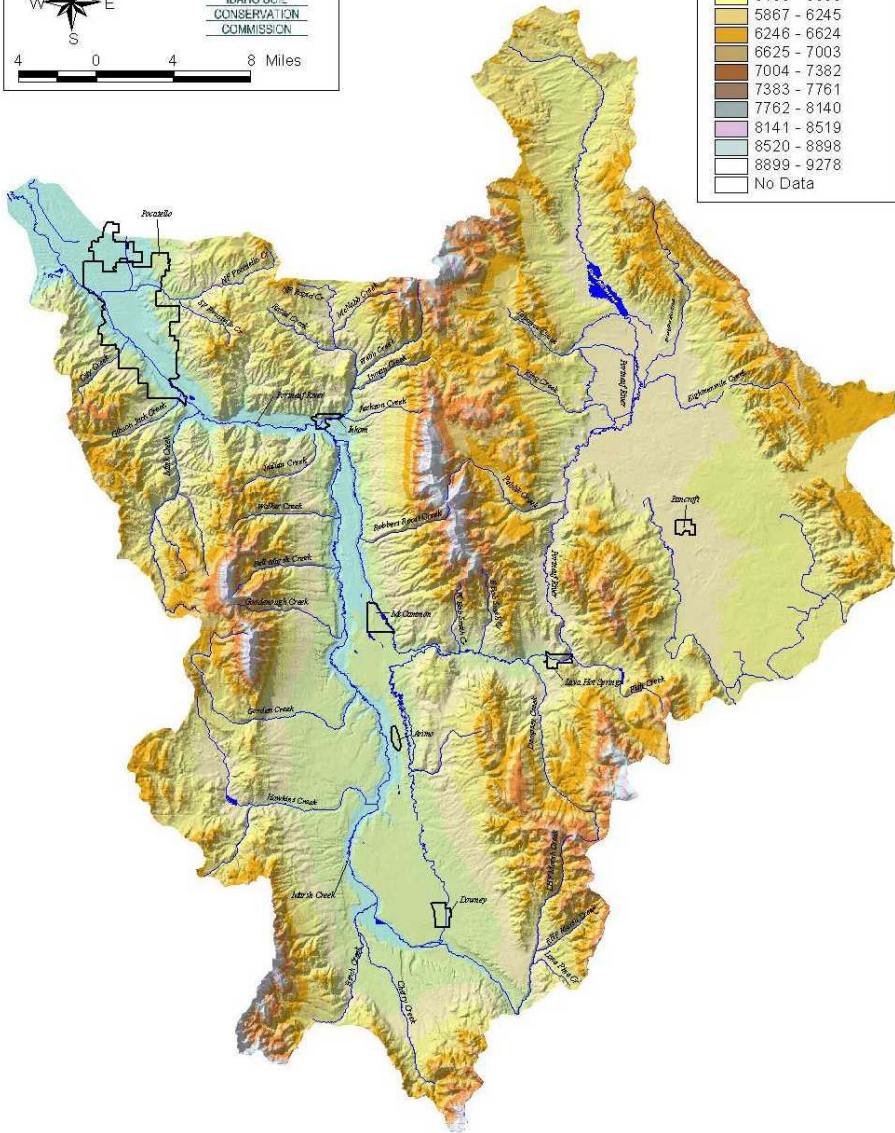
**Pathogenic strains of *E. coli* can cause bloody diarrhea, abdominal cramps, kidney failure, and loss of red blood cells.**

**O157:H7 is a strain that contains viral DNA that codes for Shiga-like toxin (SLT) that damages intestinal epithelial cells.**

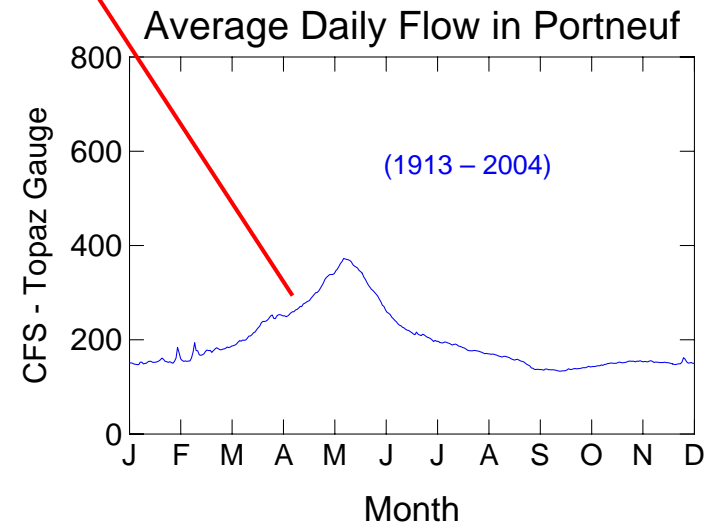
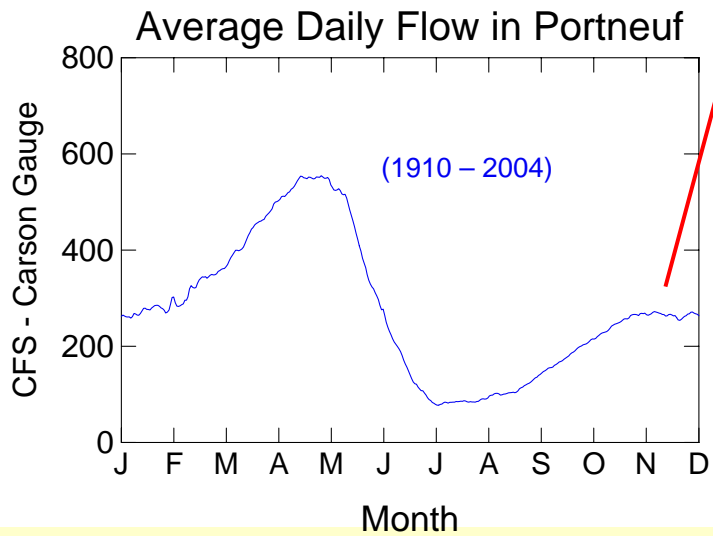
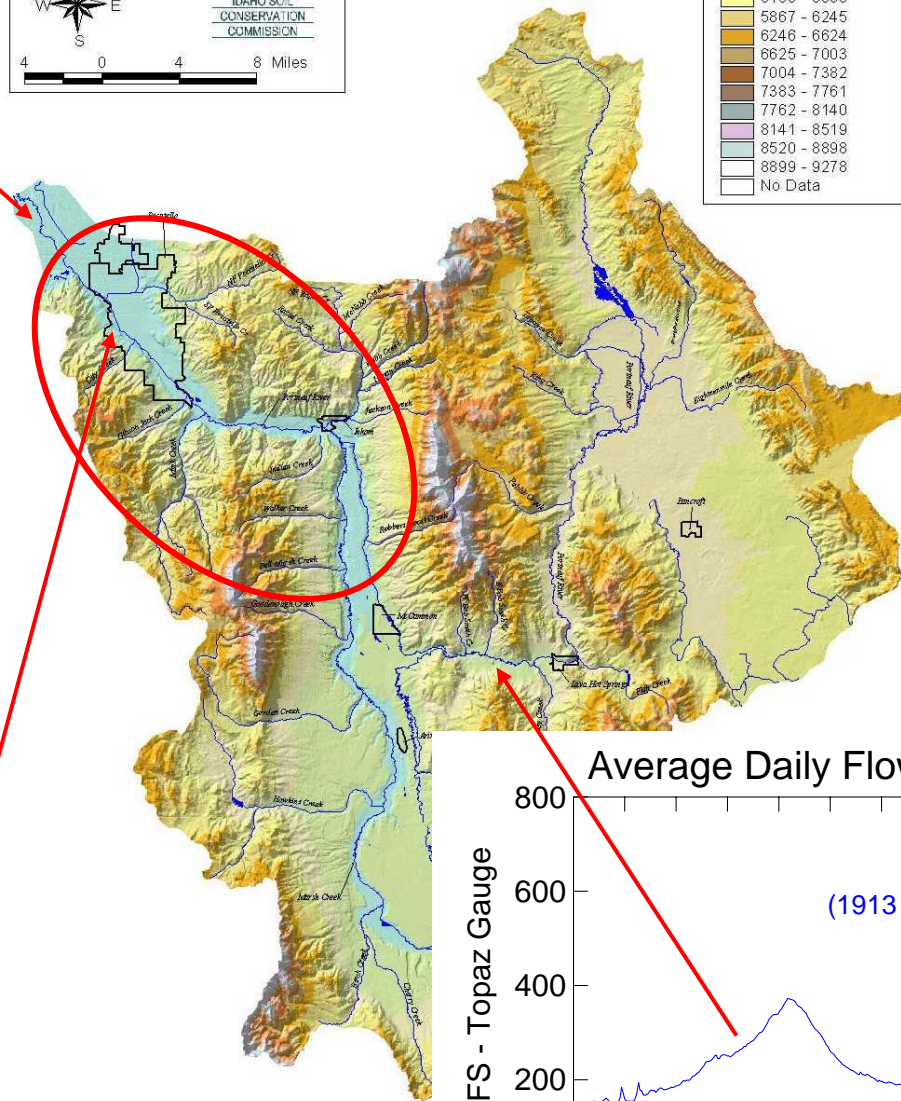
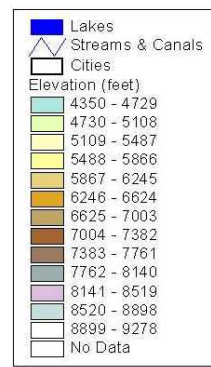
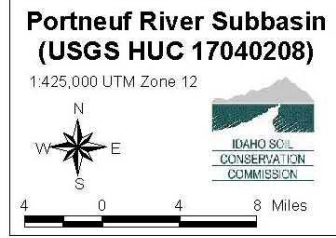
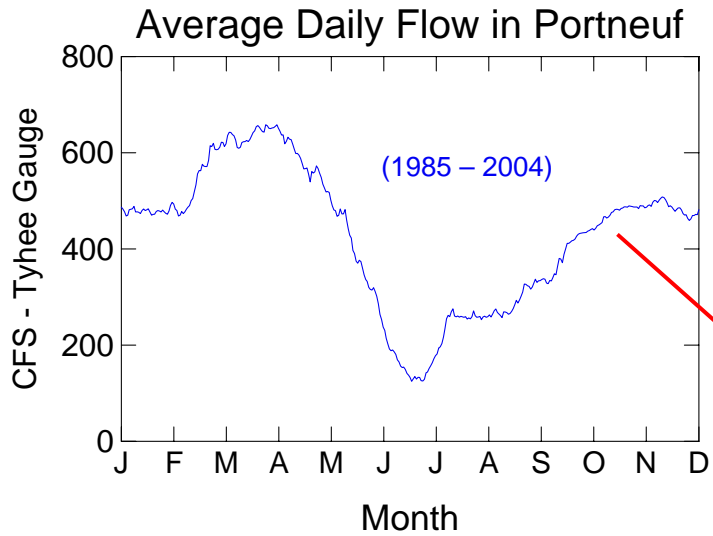
Idaho Administrative Code describes the Rules of the IDEQ in IDAPA 58.01.02, (IDAPA 58 Title 01 Chapter 02) “Water Quality Standards and Wastewater Treatment Requirements” and outlines primary and secondary contact levels for surface waters, like the Portneuf River, that are designated for recreational use. **The Primary Contact Recreation standard is 406 *E. coli* organisms per 100 mL of sample. Secondary Contact Recreation standard is set at 576 *E. coli* organisms for the same sample volume.** If *E. coli* levels exceed of these thresholds, IDEQ requires the collection of an additional 5 samples over a 30 days to confirm the long term presence of fecal coliform bacteria.

**Portneuf River Subbasin  
(USGS HUC 17040208)**

1:425,000 UTM Zone 12

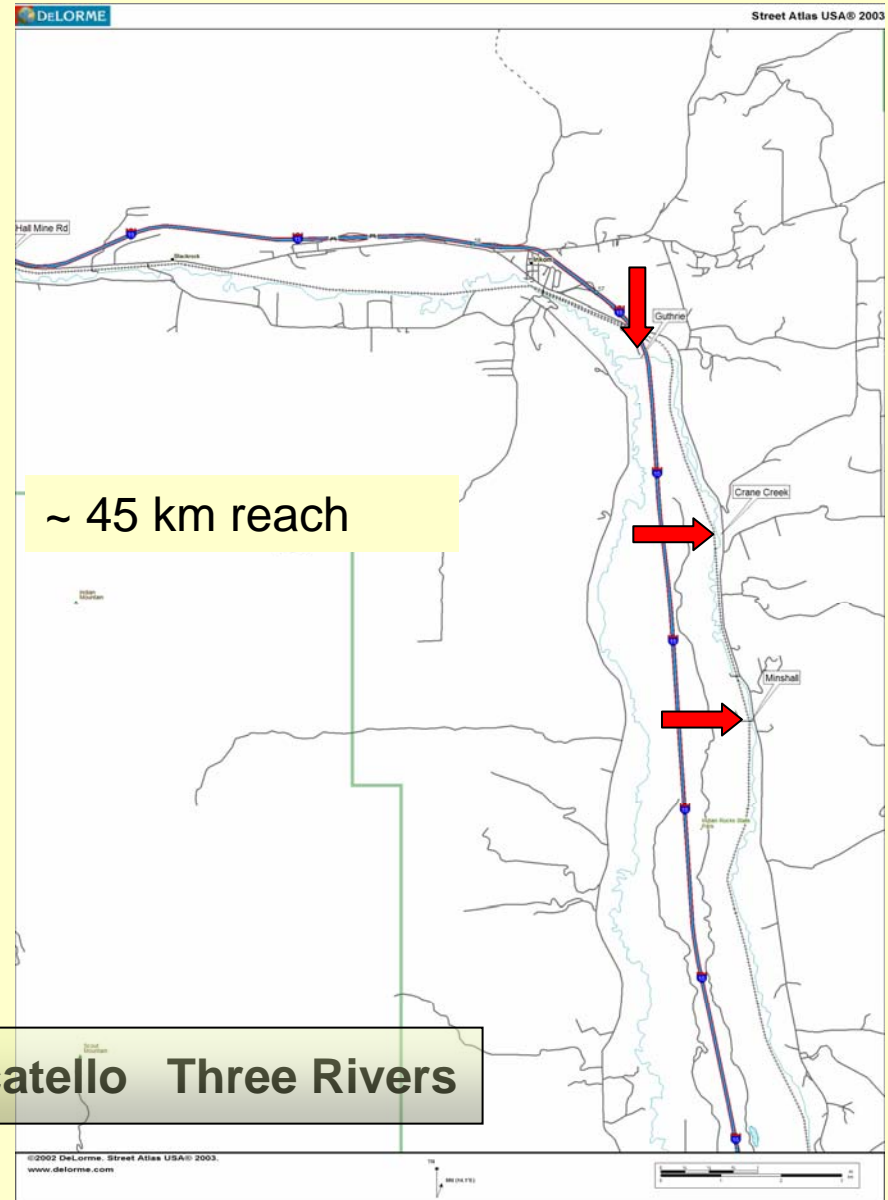
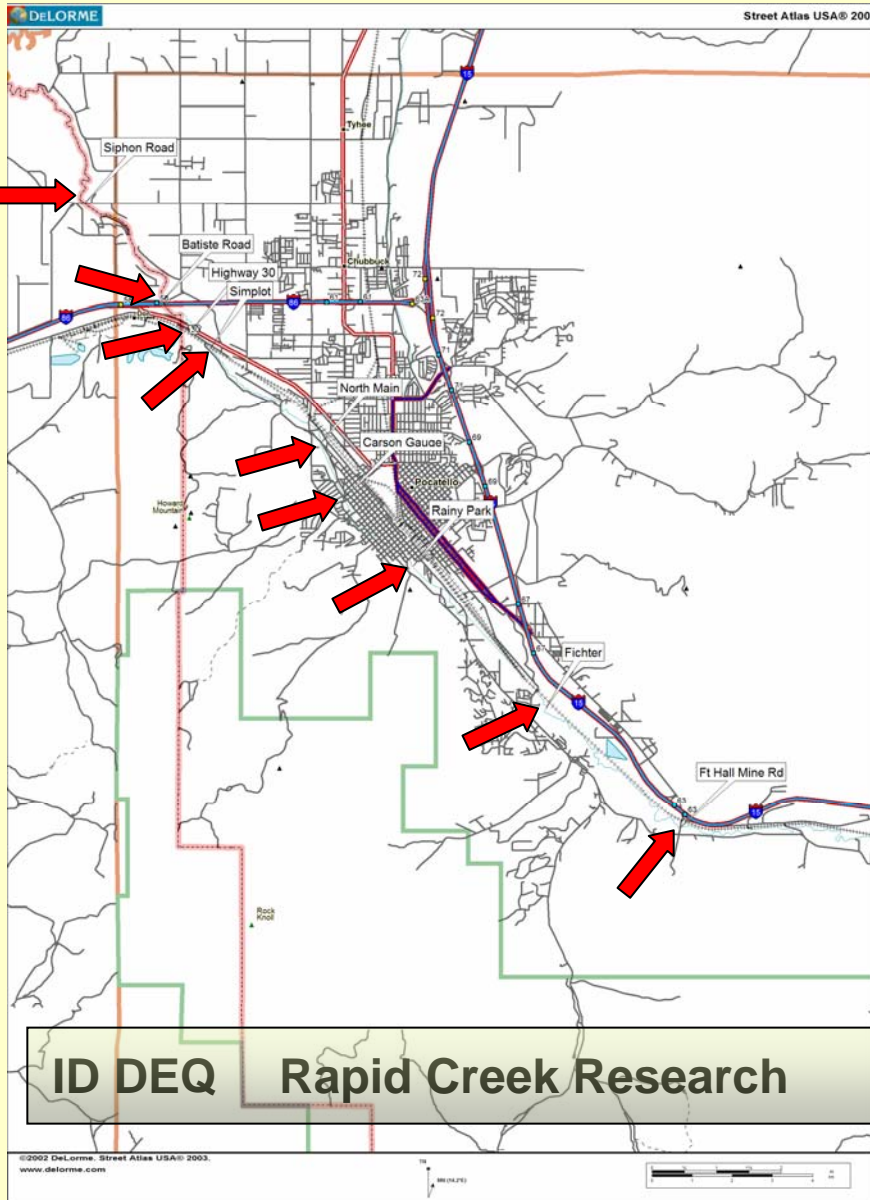


- **Portneuf watershed: 3,350 km<sup>2</sup>**
- **River length: 156 km**
- **Precipitation: < 30cm year**
- **Changes in water quality associated with land use**
- **USEPA 303d listing**

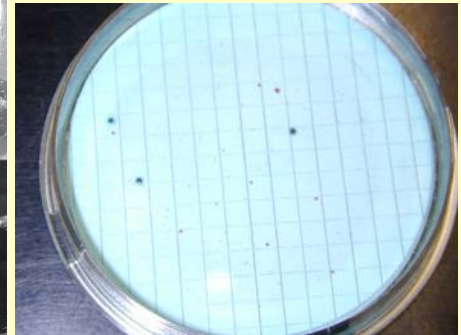
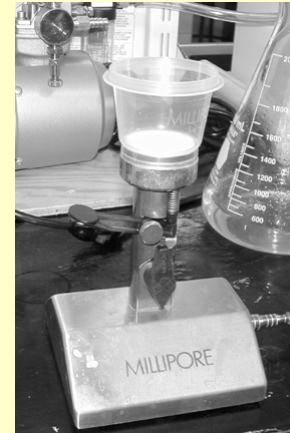




# General Ecology – Fall 2002

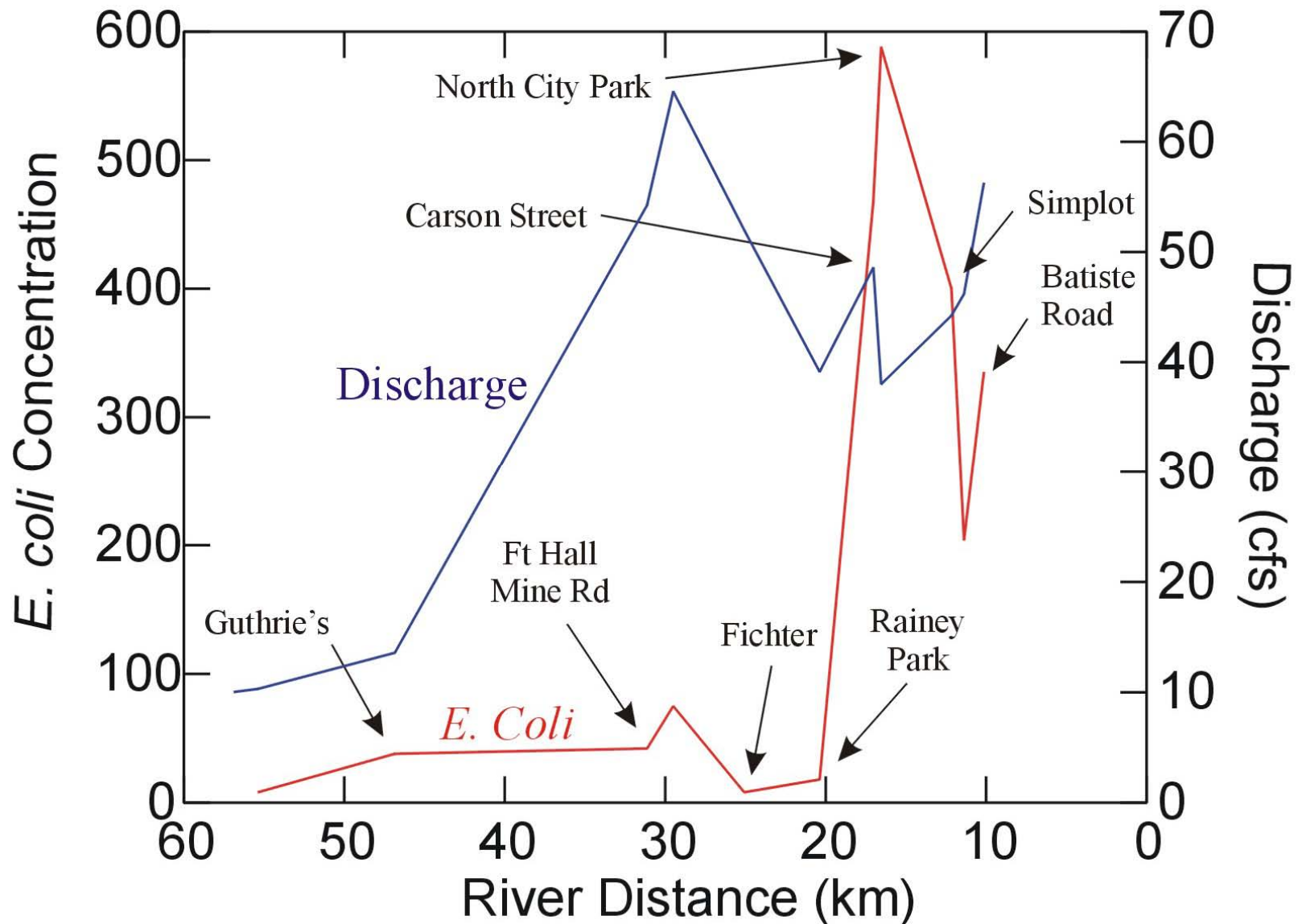


# General Ecology – Fall 2002

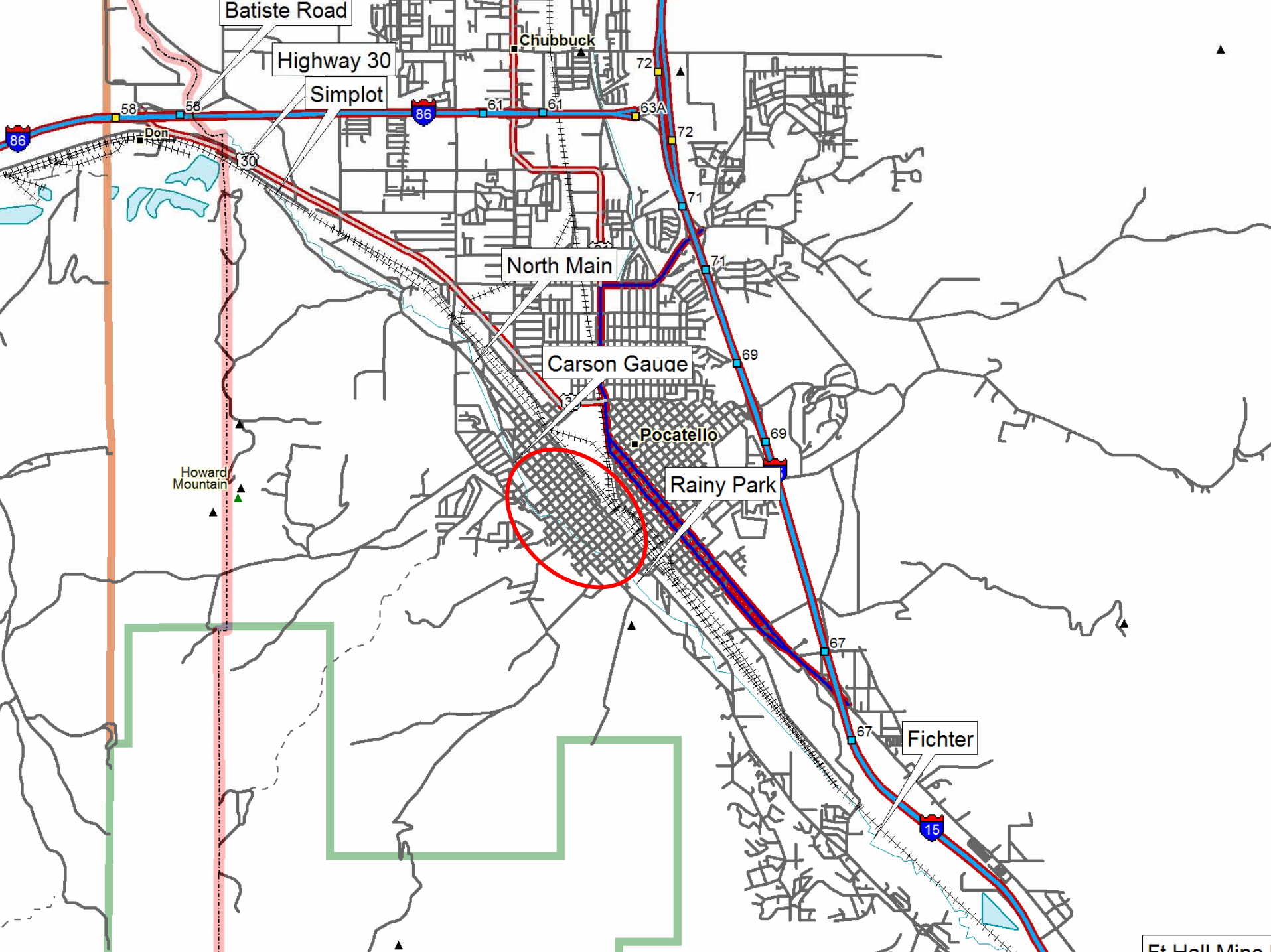




# General Ecology – September 2002







# Greenway Bridge



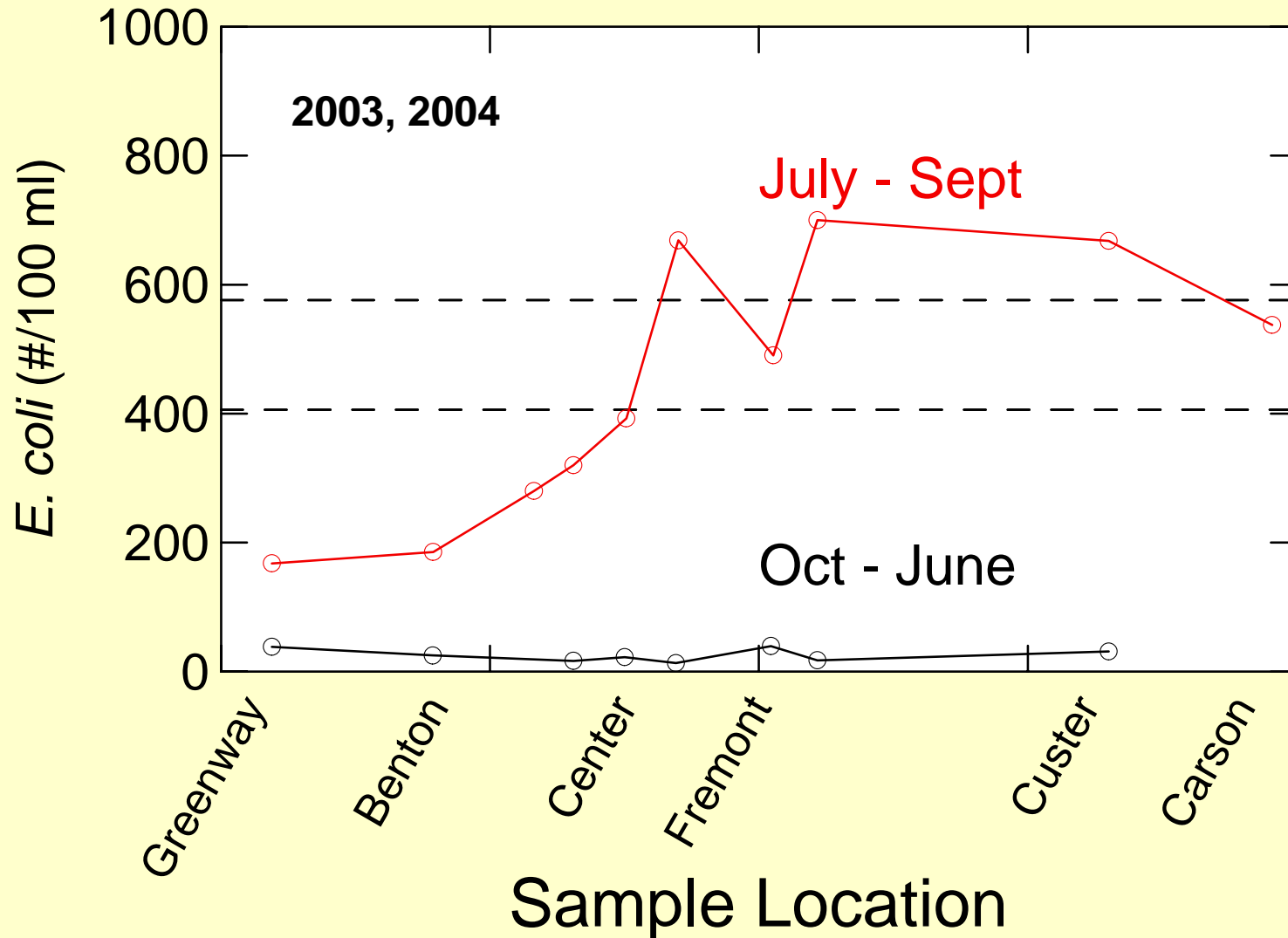


## Channel End – Carson Street

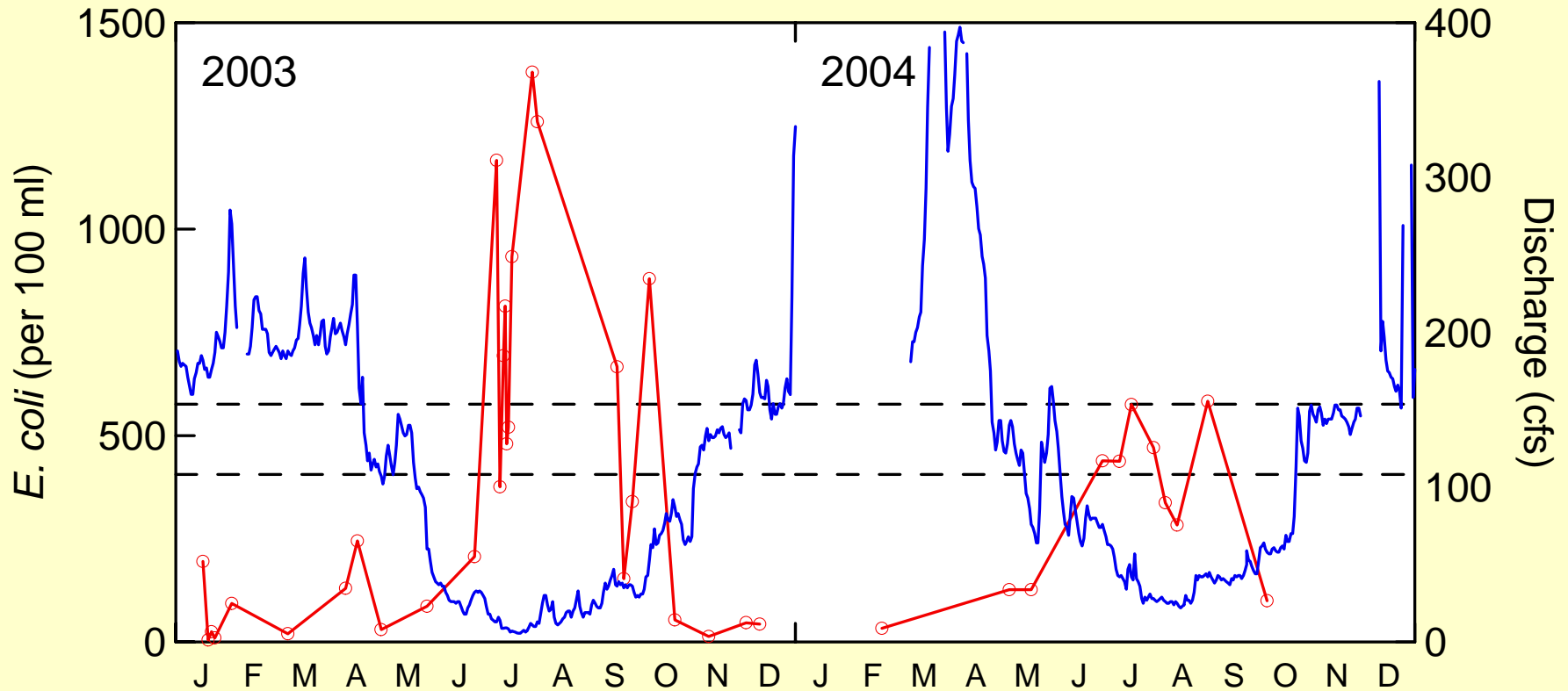




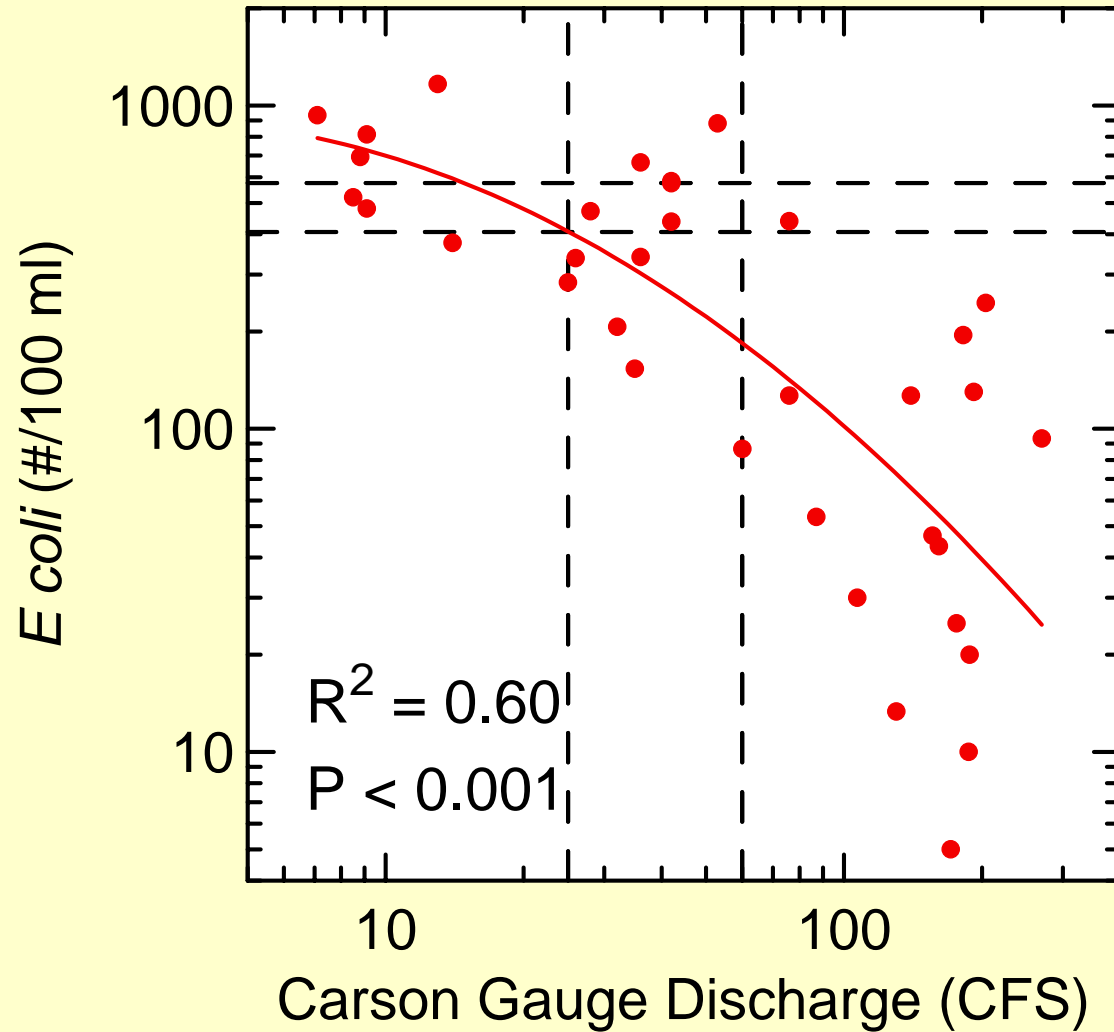
# Variation in *E. coli* density over time



# Carson Street and Carson Gauge

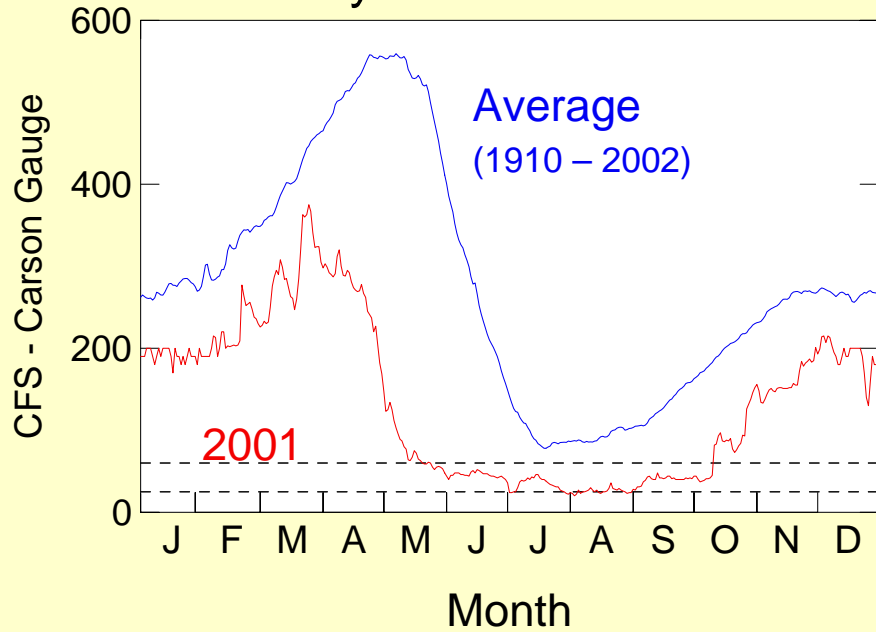


## *E. Coli* and Discharge

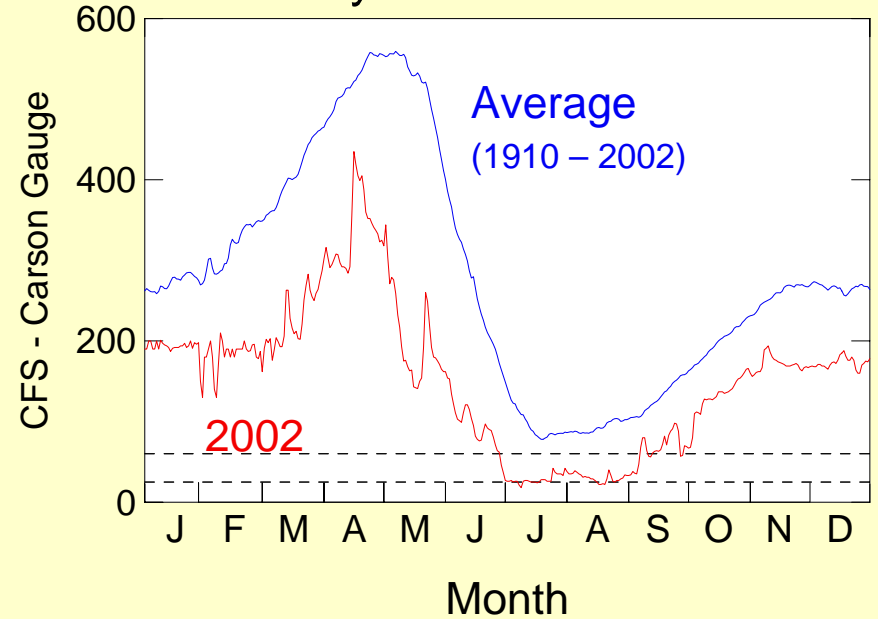




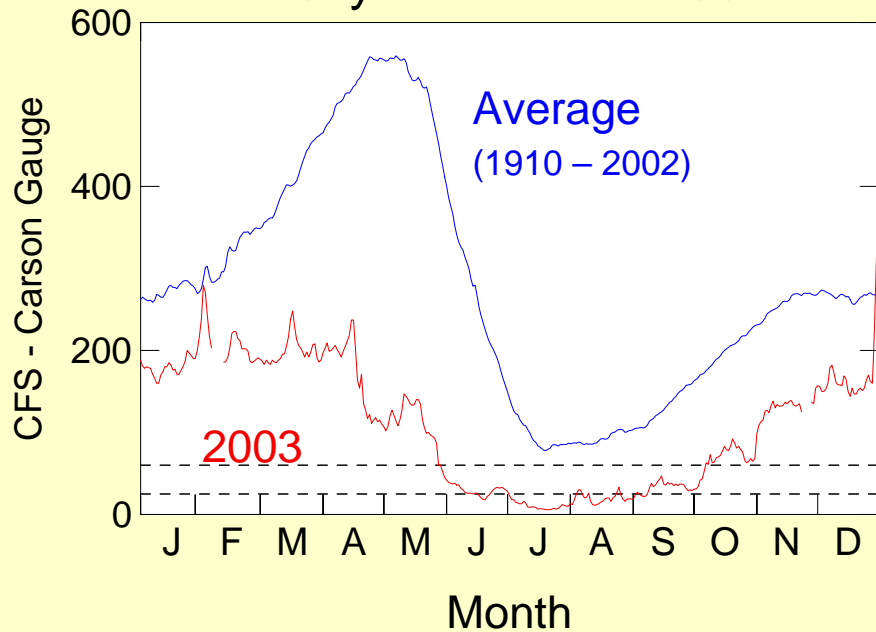
Daily Flow in Portneuf



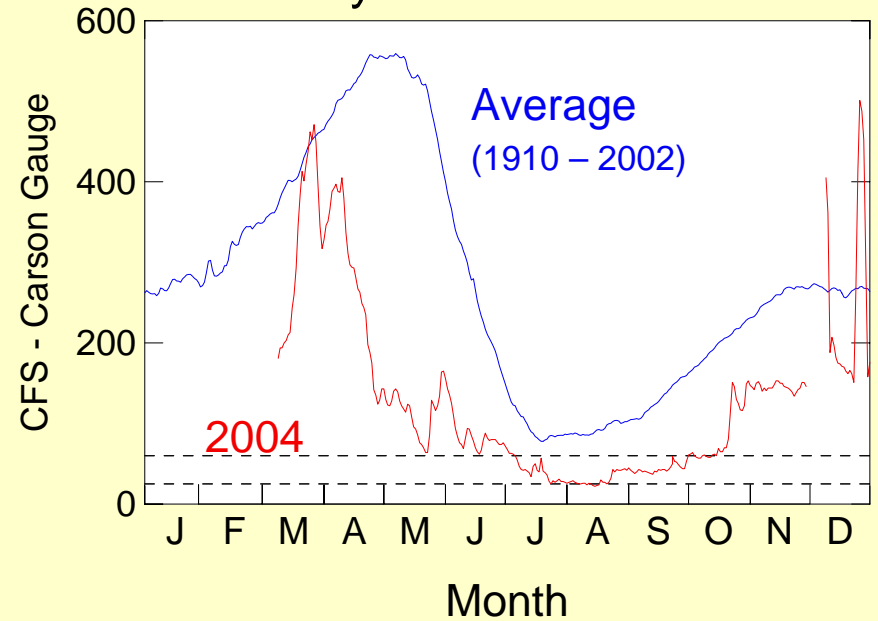
Daily Flow in Portneuf



Daily Flow in Portneuf



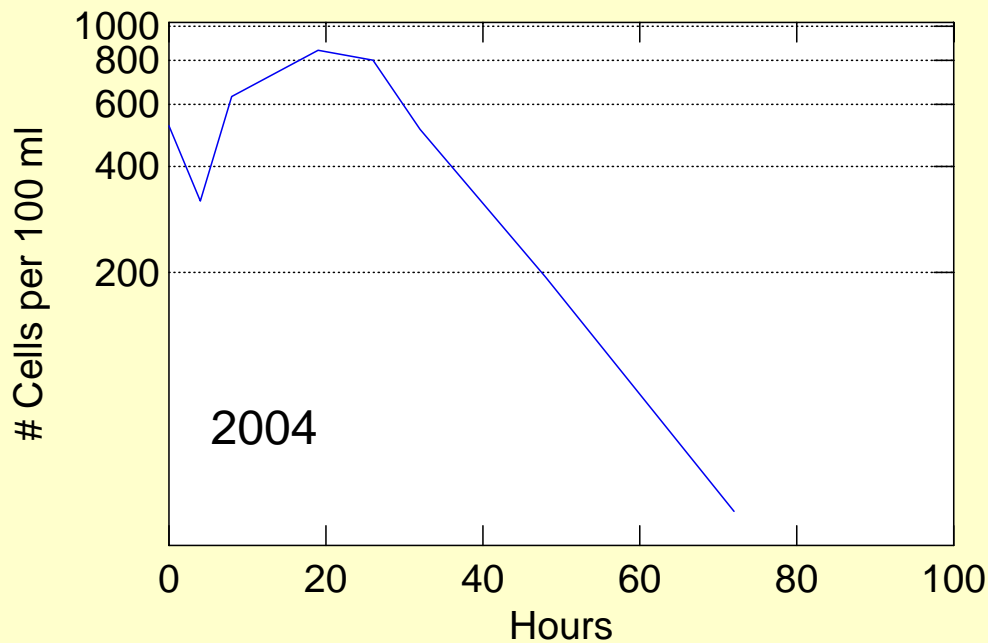
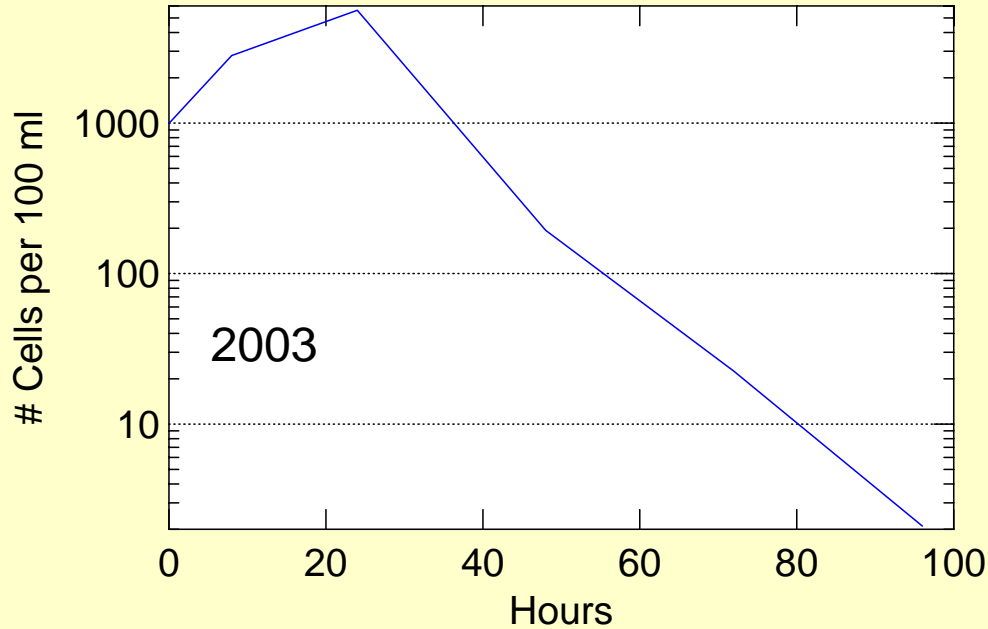
Daily Flow in Portneuf



# Sources?

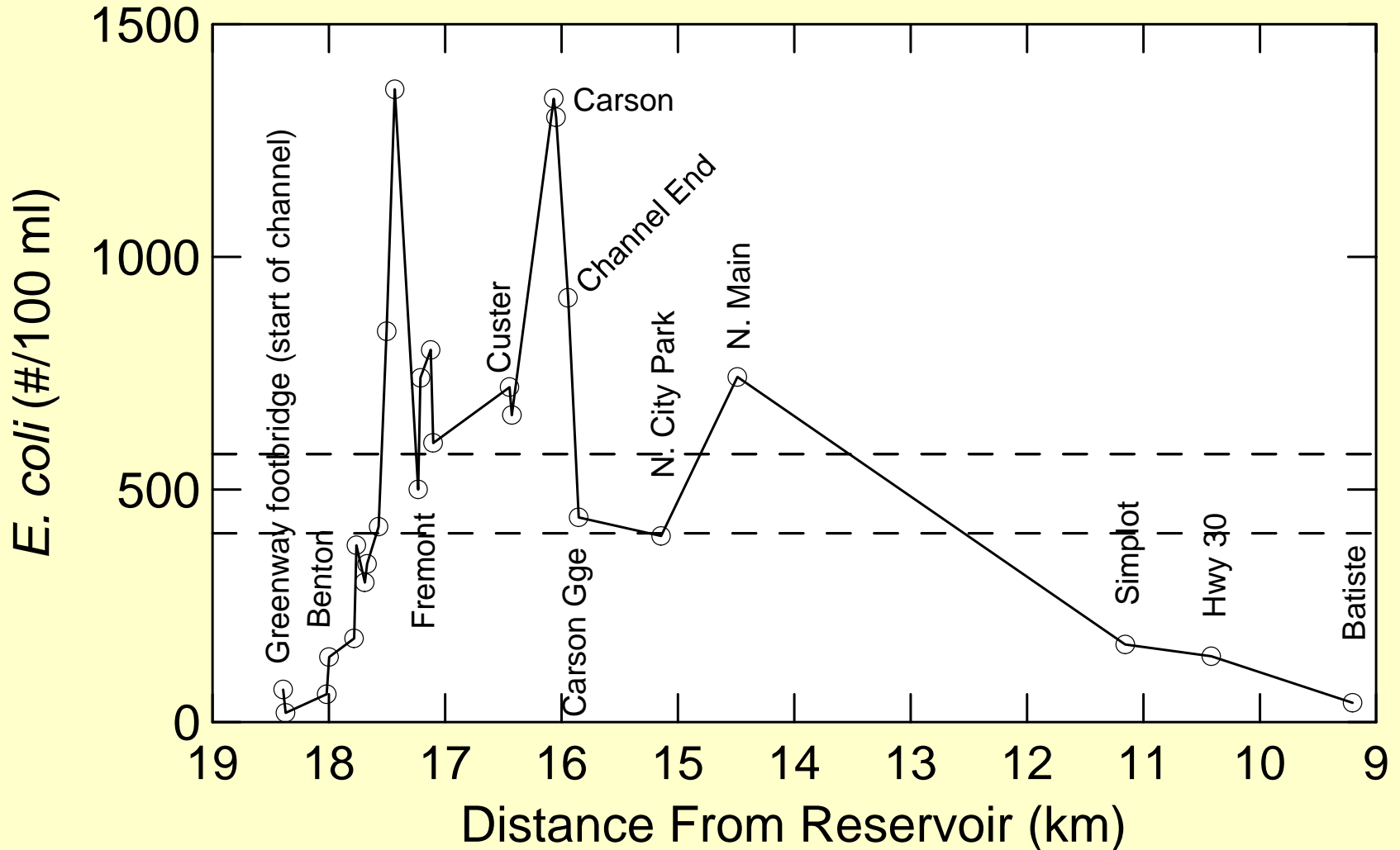


# How long will *E. coli* survive in the Portneuf River?





# Variation in *E. coli* density over space



## **Other factors that may influence the concentration of *E. coli* in the Portneuf**

- 1. Sediment:** the concentration is much higher in sediments
- 2. Temperature:** survival may be longer at cooler water temperatures
- 3. Trophic interactions:** protozoa that feed on *E. coli* can reduce the concentration of *E. coli*

# Summary

1. During the summer and early fall of at least some years, *E. coli* are present in the Portneuf River at densities that exceed Idaho standards for primary contact.
2. The density of *E. coli* increases as water flows through the concrete channel within Pocatello. Pigeons are a possible source for these bacteria.
3. The concentration of *E. coli* is inversely correlated with discharge. In each of the last 4 years discharge has been low enough to predict that *E. coli* concentrations will be above ID DEQ contact standards.
4. *E. coli* can survive for 48 hours in the water column. This survival time can be used as the basis for predictions about how far *E. coli* densities might be expected to remain elevated beyond the concrete channel.



Center for  
Ecological  
Research and  
Education



Portneuf  
River  
Ecosystem  
Project